The current drought exposes long-term water problems; it does not create them

Speaking to the Sons In Retirement,
Sacramento, CA

Phil Isenberg, Vice Chair
Delta Stewardship Council

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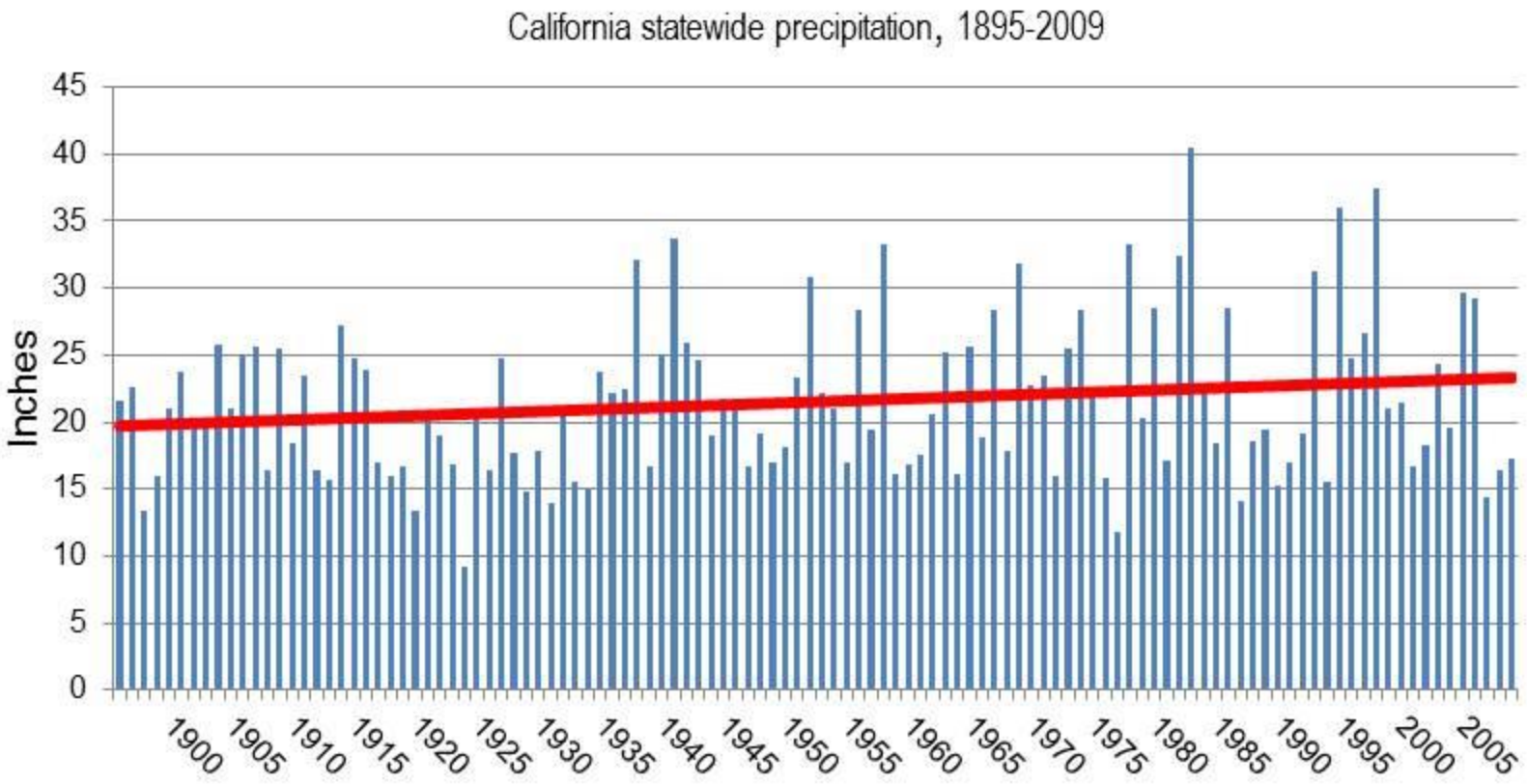
DELTA STEWARDSHIP COUNCIL

Water in California comes from rain, snow, underground and re-use

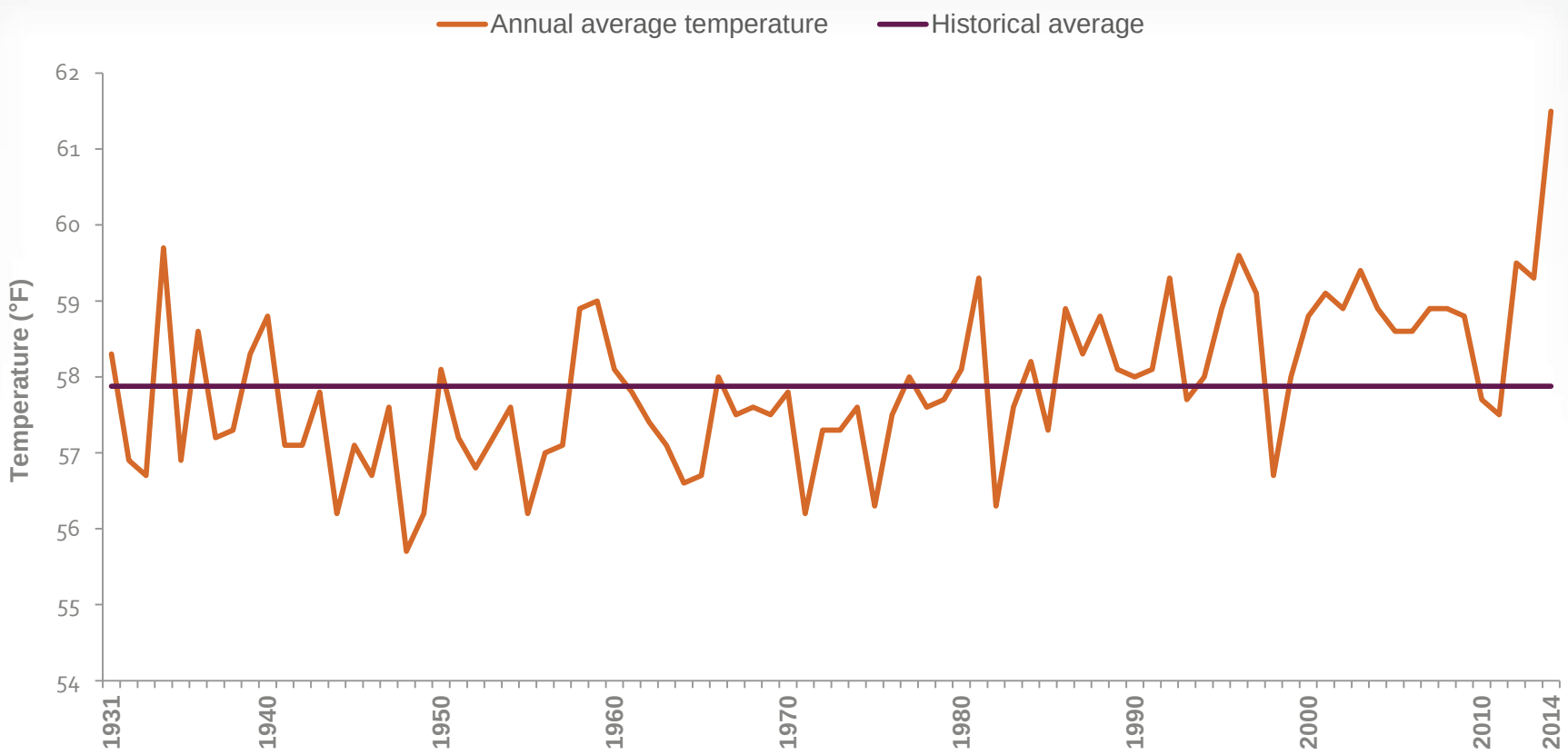
- The water supply is increasingly erratic, and the overall amount is not increasing
- We can't use all the water. Much evaporates or goes into the ground
- Our climate is changing, with higher temperatures, leading to less snow and more rain

Precipitation varies – with a slight increasing trend – and generally provides 97% of California's water supply

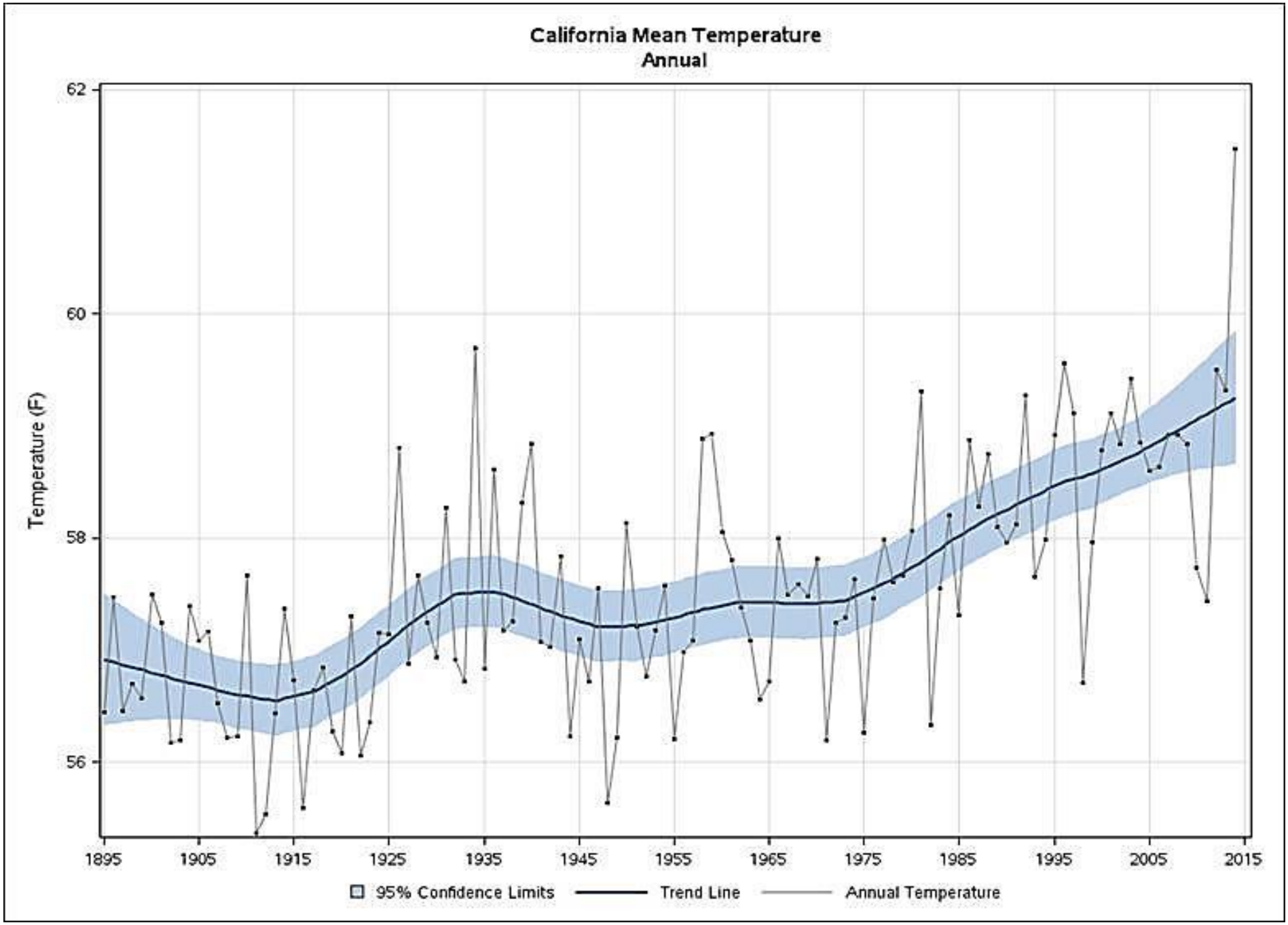


SOURCE: Precipitation from Western Regional Climate Center, 2010

California is getting warmer



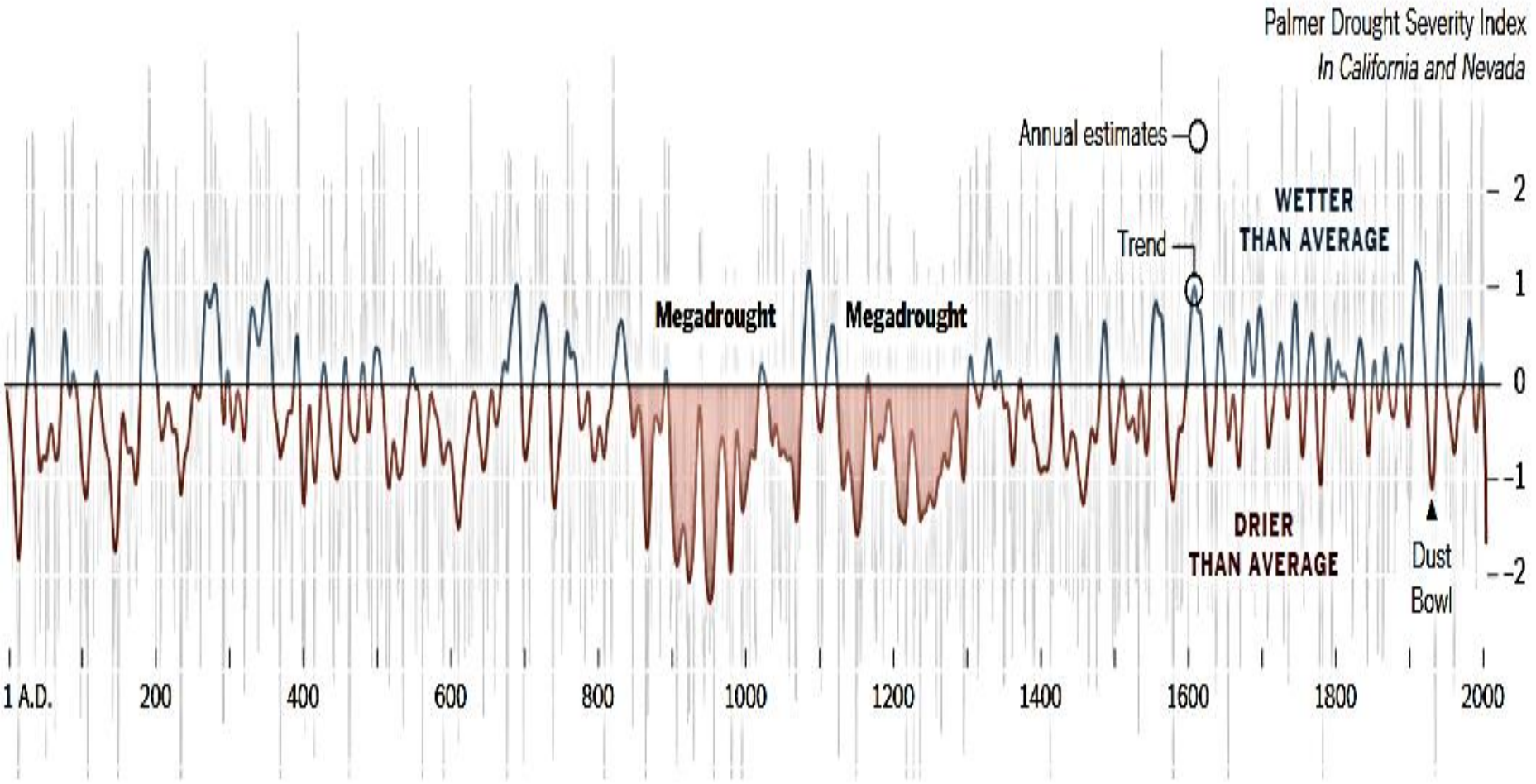
SOURCE: National Oceanic and Atmospheric Administration.
NOTE: Average statewide temperatures from 1931 to 2014. Data accessed from http://www.ncdc.noaa.gov/cag/ on June 29, 2015.



National Climatic Data Center CA Mean Temperature, 1896-2014

A Long History of Drought

Analysis of tree rings suggests that western states have had many droughts of two decades or longer, including two megadroughts lasting longer than 100 years.

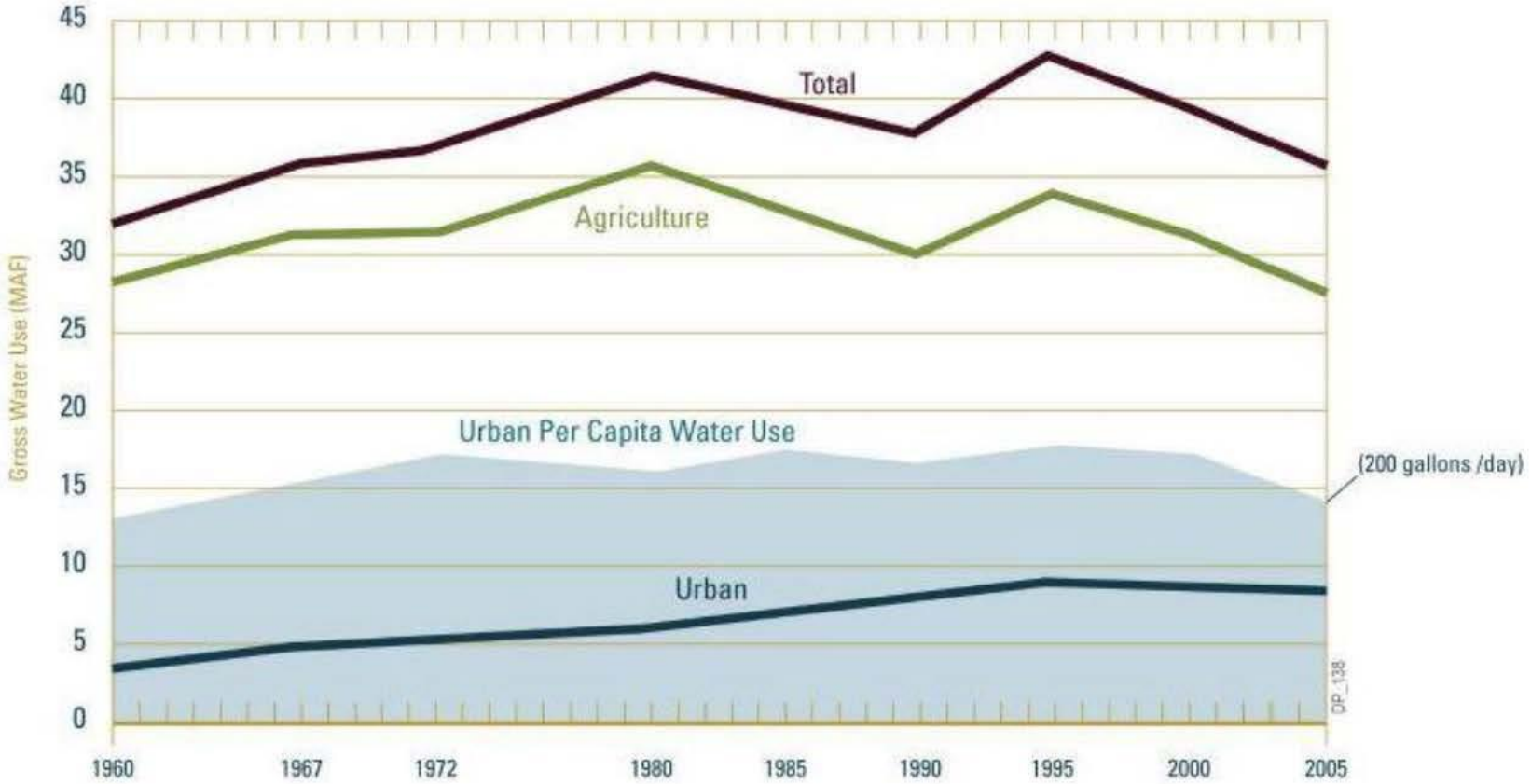


Sources: North American Drought Atlas, Lamont-Doherty Earth Observatory and the National Science Foundation; Journal of Quaternary Science

By The New York Times

April 15, 2015

Water Use Trends



Source: Hanak et al. 2011; adapted from DWR 2009 Delta Plan, 2013, Figure 3-8, Chapter 3, Page 97

Water is overpromised --- by a lot

"State water rights allocate more than 500% of average annual river flows (Grantham and Viers 2014). The current drought climate change, and normal year-to year variability in in precipitation are increasing uncertainty in water supply."

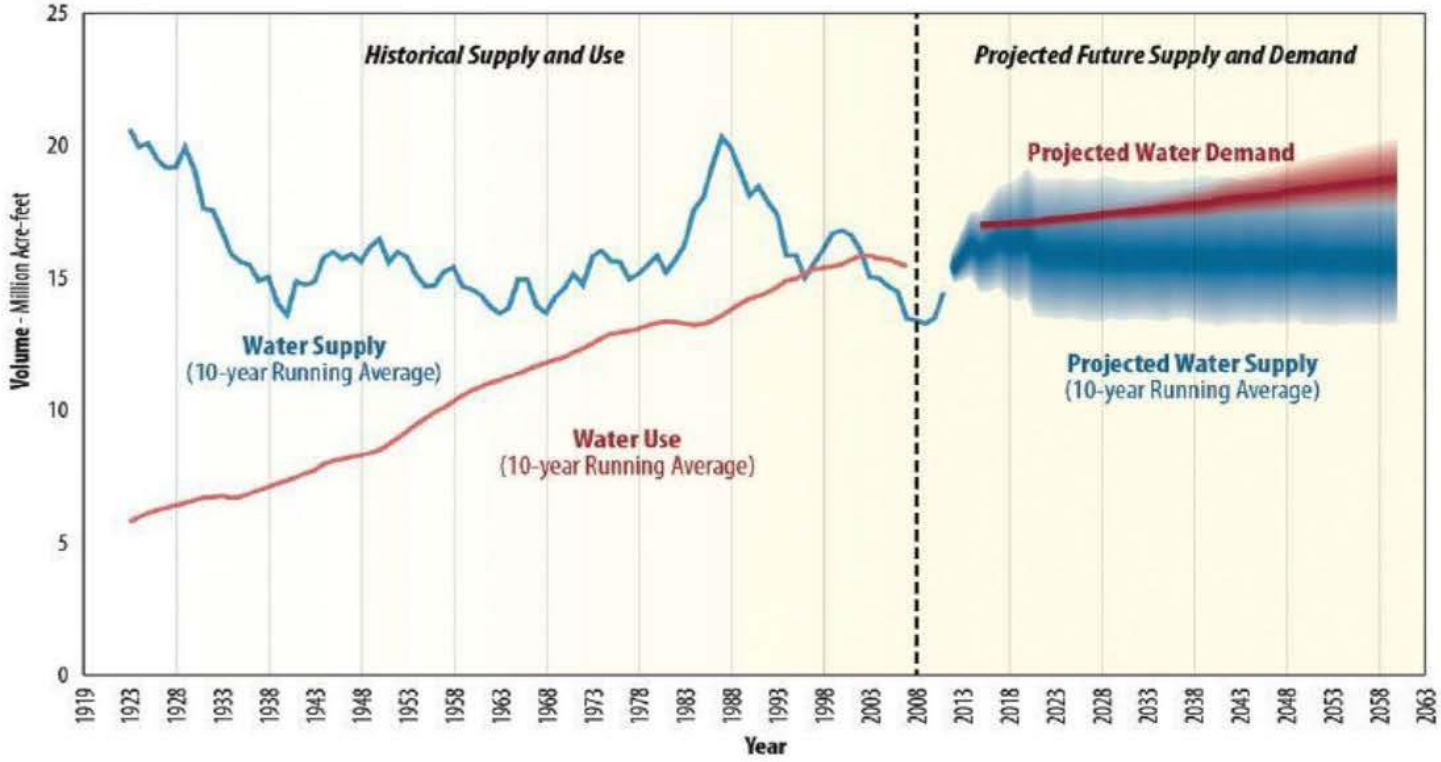
Source: ***Challenges Facing the Sacramento-San Joaquin Delta: Complex, chaotic or simply cantankerous?*** (September 2015). Report of four former Lead Delta Scientists to federal and state agencies, http://escholarship.org/uc/item/3nd0r71d.

The Colorado River: keep this in mind

Southern California gets about half of its water from the Colorado River. Any reduction in use of that source means more pressure on Delta water.

Matching Demands to the Supply Available from the Colorado River is Inevitable

Historical Supply and Use and Projected Future Colorado River Basin Water Supply and Demand



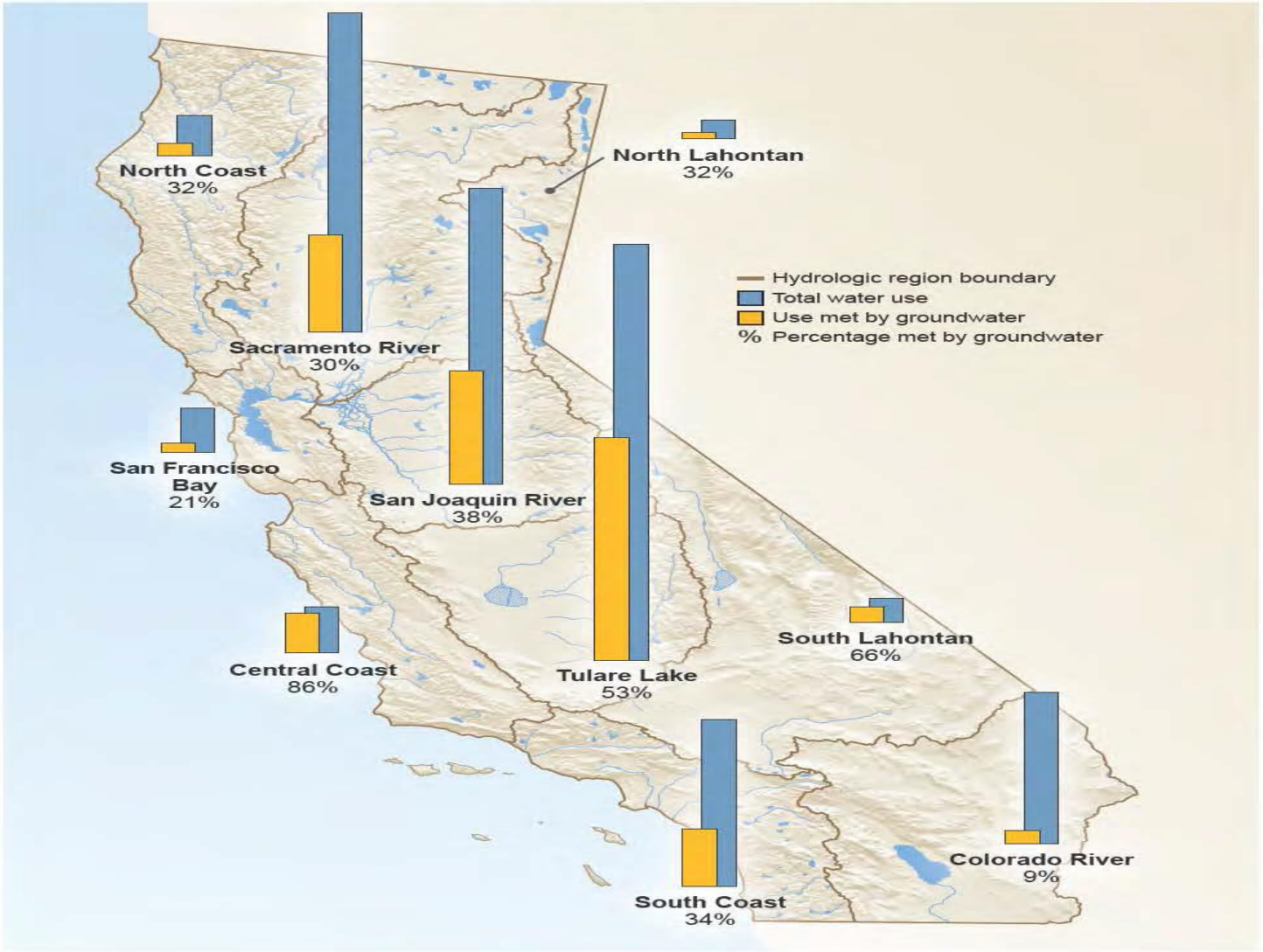
Source: US Bureau of Reclamation

Groundwater: a special problem

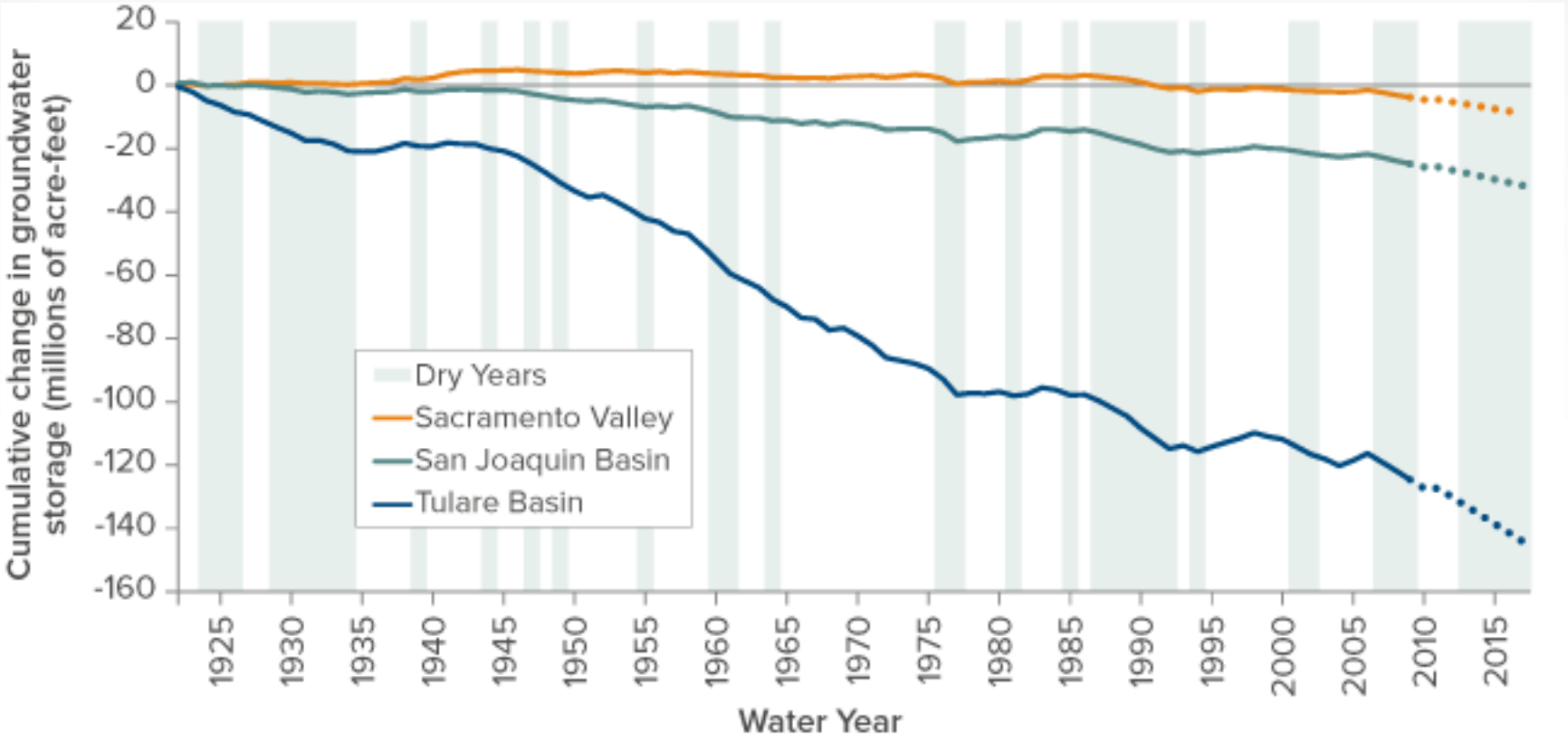
In an average water year, almost 30% of our total water used for human purposes comes from underground. In a dry year, underground water can account for as much as 60%. Ground subsidence happens when too much water is taken.

Source: DWR, California's Most Significant Droughts: Comparing Historical and Recent Conditions (February 2014) See next slide.

Figure 1.13: Groundwater Contribution to Total Water Use by Hydrologic Region

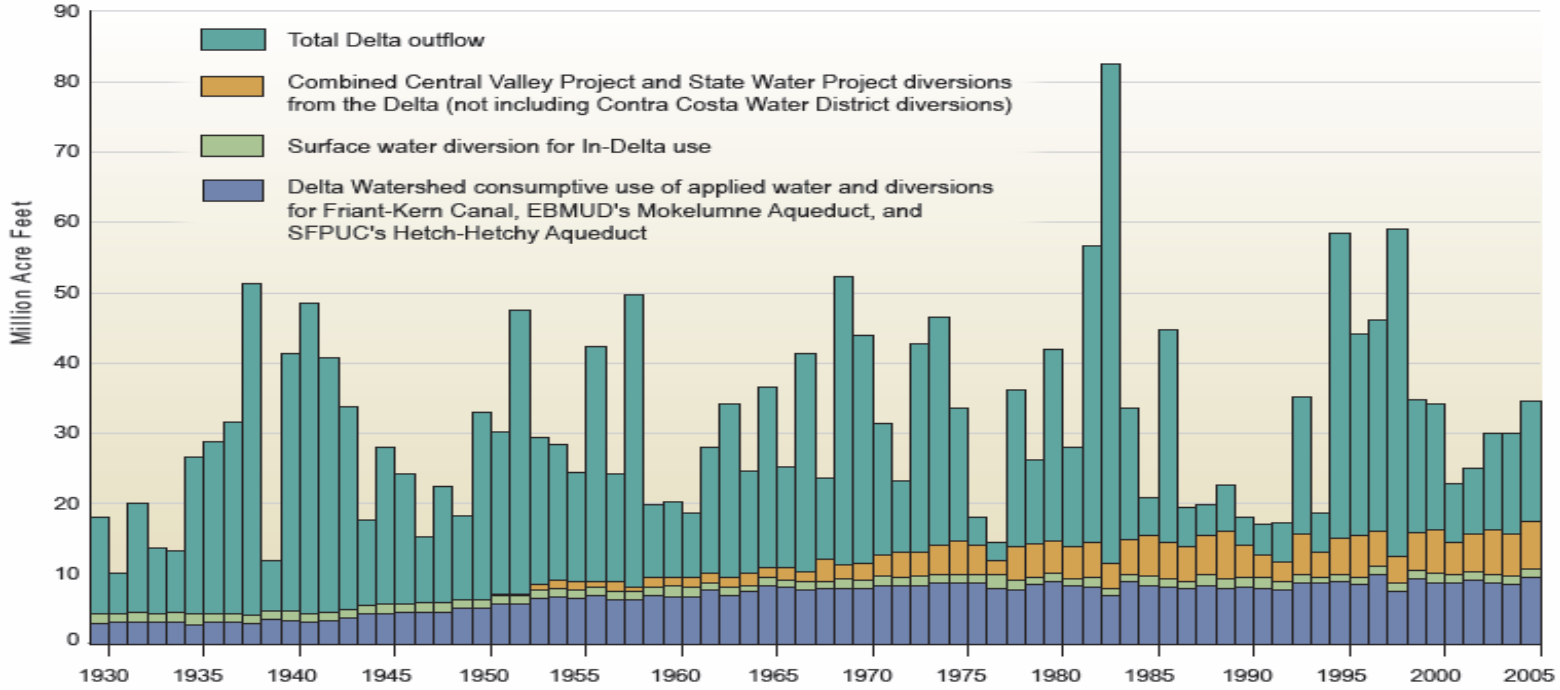


Groundwater reserves are being depleted, especially in the Tulare Basin



SOURCE: What If California's Drought Continues? (PPIC, 2015), Figure 3.Data through 2009 from DWR; author estimates after 2009. Projections since 2009 may underestimate depletions since the onset of the latest drought (2012+)..

Delta Watershed Consumptive Use



Trends in Destinations and Uses

Period	Average Annual Total (MAF)	Outflow	in-Delta	Exports	Delta Watershed
1930 to 1949	25.80	81%	5%	0%	14%
1990 to 2005	31.71	67%	4%	4%	24%
1950 to 1969	34.34	51%	5%	15%	29%
1970 to 1989	32.85	48%	4%	17%	31%

Source: Delta Vision Blue Ribbon Task Force. Delta Vision Strategic Plan 2008. Also see California Water Plan Update 2009, Volume 3, Figure D-5. Measured, calculated, and modeled data from an array of sources as compiled by Tully and Young, Inc. with data and assistance from DWR, the Bay Institute, and the State Water Contractors.

• While exports are sometimes viewed as the sole cause for reduced outflow, upstream diversions consume about two times as much of the water that would otherwise flow out to the Bay.

• Increases in upstream diversions, in-Delta use, and project exports have dramatically reduced ocean outflows from the


WE HAVE MET THE ENEMY AND HE IS US.
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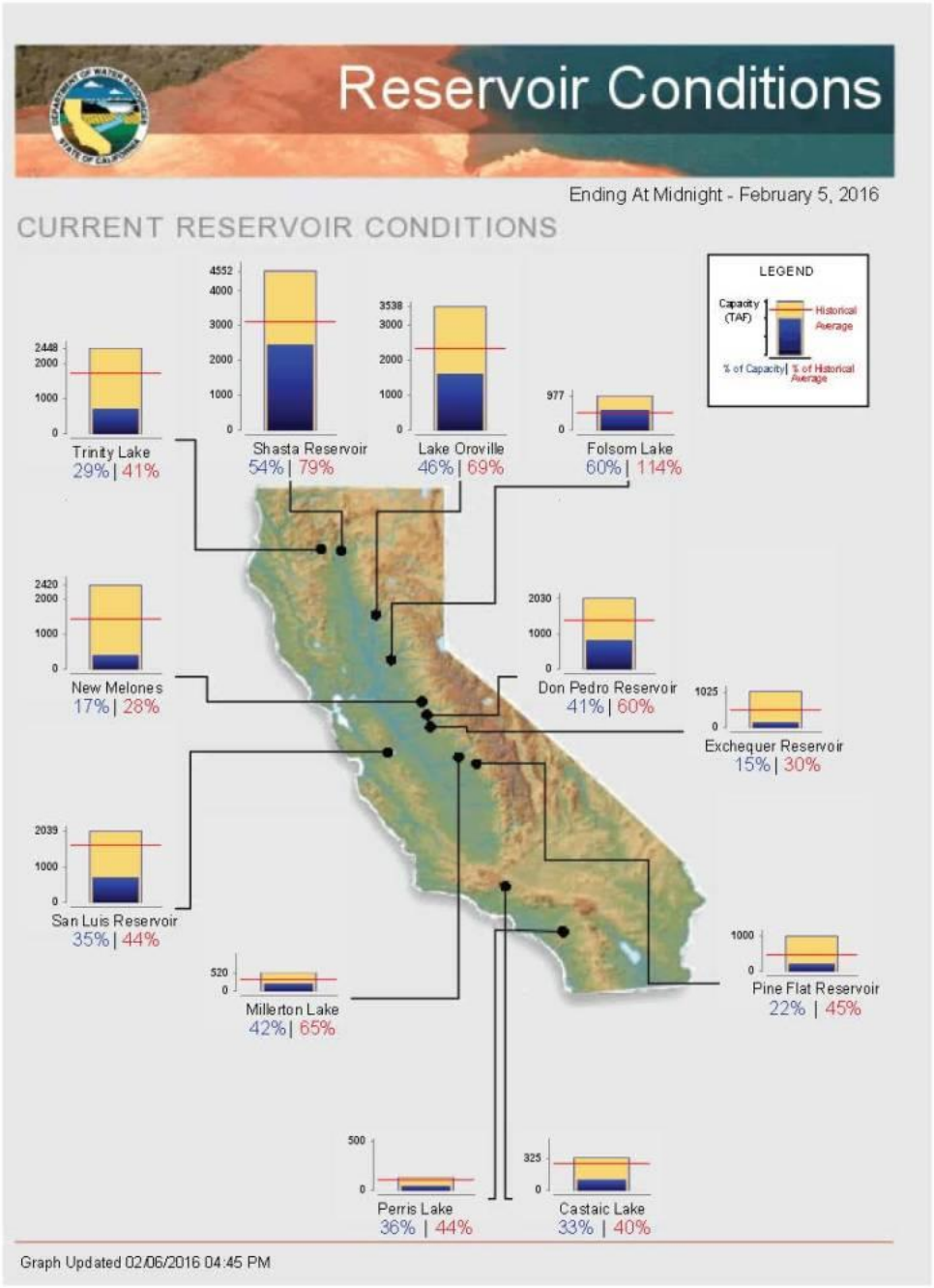
Sources of Information

This is a short list of recommended readings

Maven's Notebook, www.mavensnotebook.com. The best single source for news, scientific reports and information, and detailed reports on important conferences and meetings. In addition, read weekly weather and water reports, a summary of blog commentary and much more. All of this comes free of advocacy or policy preferences. Make up your own mind.

The West without Water: What Past Floods, Droughts, and Other Climatic Clues Tell Us about Tomorrow 2013, by B. Lynn Ingram and Frances Malamud-Roam, University of California Press. The single best California-focused study on our water supply over the past 2,000 years. This merges modern weather studies together with the best of paleoclimate research


Reservoir Conditions
Ending At Midnight - February 5, 2016
CURRENT RESERVOIR CONDITIONS
LEGEND
Capacity (TAF)
Historical Average
% of Capacity
% of Historical Average
Trinity Lake
29% | 41%
Shasta Reservoir
54% | 79%
Lake Oroville
46% | 69%
Folsom Lake
60% | 114%
New Melones
17% | 28%
Don Pedro Reservoir
41% | 60%
Exchequer Reservoir
15% | 30%
San Luis Reservoir
35% | 44%
Millerton Lake
42% | 65%
Pine Flat Reservoir
22% | 45%
Perris Lake
36% | 44%
Castaic Lake
33% | 40%
Graph Updated 02/06/2016 04:45 PM